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PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Impact Operated Screw Turning Tool

I, ARTHUR JACK SACKVILLE EVANS, a British Subject, of Quality House, Quality Court, Chancery Lane, London, W.C.2, do hereby declare the invention 5 (as communicated to me from abroad by Edwin Norman Carlson, Paul Herman Carlson and Warren Elof Carlson, of 858, Iglehart Avenue, St. Paul 4, Minnesota, United States of America, 1061, Selby 10 Avenue, St. Paul 4, Minnesota, United States of America, and 709 S. 2nd Street, Stillwater, Minnesota, United States of America, respectively, all Citizens of the United States of America), for which I 15 pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to tools for turning screws, bolts, nuts and the like by the transmission thereto of a percussive force. Such fastenings often become so firmly fixed that it is difficult to start them by means of ordinary hand operated driving 20 tools when it is desired to withdraw them. Also in setting them up a final tightening beyond the power of such tools is sometimes desired. It has therefore been proposed to provide a tool having a work- 25 engaging bit and embodying suitable motion modifying mechanism so that a blow on the butt or head is translated by the mechanism into a rotary movement of the bit.

30 In accordance with the present invention there is provided a tool with handle which may be encircled by the grasping hand and which has a massive head to receive a blow from a hammer, the handle 35 having a cylindrical socket which receives a cylindrical member for carrying the work-engaging bit. This member is rotatively received in the socket and is formed with a transverse slot extending 40 entirely through the substance of the driven member the intersection of said slot with the surface of the member defining short helical arcs corresponding to the 45 segments of a double thread. A cross-pin

traverses this slot and its ends are supported in the handle with the ends substantially flush with the exterior surface thereof, the pin transmitting to the walls of the slot a force tending to rotate the bit-carrying member and its bit. 50

55 The invention will be well understood by reference to the following description of the illustrative embodiment thereof shown by way of example in the accompanying drawings wherein:—

60 Fig. 1 is a perspective view showing the tool in use;

Fig. 2 is a view through the tool partly in vertical section;

Fig. 3 is a section on the line 3—3 65 of Fig. 1; and

Figs. 4, 5 and 6 are partial sections showing different positions of the parts.

Referring now to the drawings, the tool embodies a handle and driving member 10 and a driven member 12 carrying the work-engaging bit 14 the latter herein shown as a socket wrench and as a separate member secured by a ball catch 16. Such a bit when separable may be considered 70 in a sense an accessory to the tool proper and it may be interchanged with socket wrenches of different sizes, with screwdriver bits and with plug wrenches. The outer surface of the handle 10 is substantially smooth, although it may be filled 75 as indicated to provide a frictional grip for the grasping hand and it is of a length to extend above the hand, as illustrated in Fig. 1, to provide a head or butt for 80 striking. Beneath the solid head portion is a cylindrical socket 18 which receives the cylindrical bit-carrying member 12 which is supported by the spring 22. Extending entirely through this driven 85 member is a slot which defines at one side of the member a short helical arc 24—L, and on the other side a diametrically opposed helical arc 26—L of the same pitch, the two corresponding to short segments of a double or two star thread. 90 Herein, because the tool is designed to exert both unscrewing and screwing 95

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forces, similar arcs 24—R and 26—R of opposite hand are provided, the slot thus defining chevron shaped figures at opposite sides of the driven member 12, as best seen in Figs. 4, 5 and 6. A cross-pin 28 is driven through diametrically opposed holes in the walls of the socket 18 of the handle member and passes through the slot. The ends of the pin are tight in these holes and terminate substantially flush with the outer wall of the handle, there being no projections which might lacerate the hand.

The operation of the tool will be understood from Figs. 4, 5 and 6. For purposes of clear illustration Fig. 2 shows the parts as they would be at the end of a turning stroke and Fig. 4 shows them in the same position when viewed from the right of Fig. 2. Normally with the tool free the spring 22 presses the handle 10 upwardly relative to the member 12, bringing the pin 28 in the end of either the right-hand arcs 24—R or 26—R or, as in Fig. 5, the left-hand arcs 24—L and 26—L which latter is the correct position for applying an unscrewing force. The tool is applied to the work by placing the bit 14 over the head of a bolt as shown in Fig. 2. The handle member 10 may then be twisted in the direction of motion desired and, if the pin is not in the proper slot it passes through the position shown in Fig. 4 and into the proper slot in a position such as is shown in Fig. 5, where it appears in the upper portion of the slot defining the arcs 24—L and 26—L. If the butt of the tool is now hit with a hammer the pin descends substantially rectilinearly and its reaction on the lower wall of the slot causes the bit-carrying member to move in the unscrewing direction as indicated in Fig. 6. The action may then be repeated, the hand twisting the handle 10 in the desired direction of motion, returning the pin 28 to the position of Fig. 5 after which another blow moves the driven member to the position of Fig. 6 again.

The cross-pin 28 supported at both ends is admirably adapted for effecting the driving action, and it operates on a solid and substantial block of metal the entire length of the pin between its walls being in contact with camming walls of the slot for efficiency in the transfer of force to the latter and to distribute the stress on the pin. Reference has been made to the slots as defining short helical arcs by which is meant arcs of less than a complete turn, and preferably less than one-half a turn as

herein shown. Considering a helical slot of either right-handed or left-handed pitch alone cut entirely through the body of a member as herein, whether solid or tubular, it is clear that if it extended for one or more turns the body of the member would be converted into an open spiral with consequent weakening of the same so that it would not efficiently withstand the percussive blows which it is desired to exert. In the case of both a right-hand and a left-hand slot as herein described, the cylindrical piece of stock would be completely severed into pieces. Herein however the invention is concerned with a sudden blow effecting a motion of small amplitude. Therefore the arcs are short and this permits the slot to be cut entirely through the body of the male driven member with resultant desirable rigidity and durability in the completed article.

What I claim is:—

1. A tool for operation by percussion exerted axially thereon to apply rotative force to a threaded member comprising a handle for encirclement by a grasping hand having a massive head to receive hammer blows at a point above the hand, the handle having a cylindrical socket, a cylindrical driven member for carrying a work-engaging bit, which member is rotatively received in said socket and is formed with a transverse slot the intersection of said slot with the surface of the member defining short helical arcs corresponding to segments of a double thread and having homologous portions diametrically aligned, the slot extending completely through the substance of the driven member to provide for the passage across said member of the cross-pin hereinafter mentioned, the handle having aligned openings and a cross-pin having its ends received by and tightly fitting said openings and extending through the slot, the ends of the pin being at least substantially flush with the exterior surface of the handle.

2. A tool as defined in Claim 1 wherein the figures defined by the slot at the surface of the driven member are chevron shaped and correspond to short segments of right and left hand double threads.

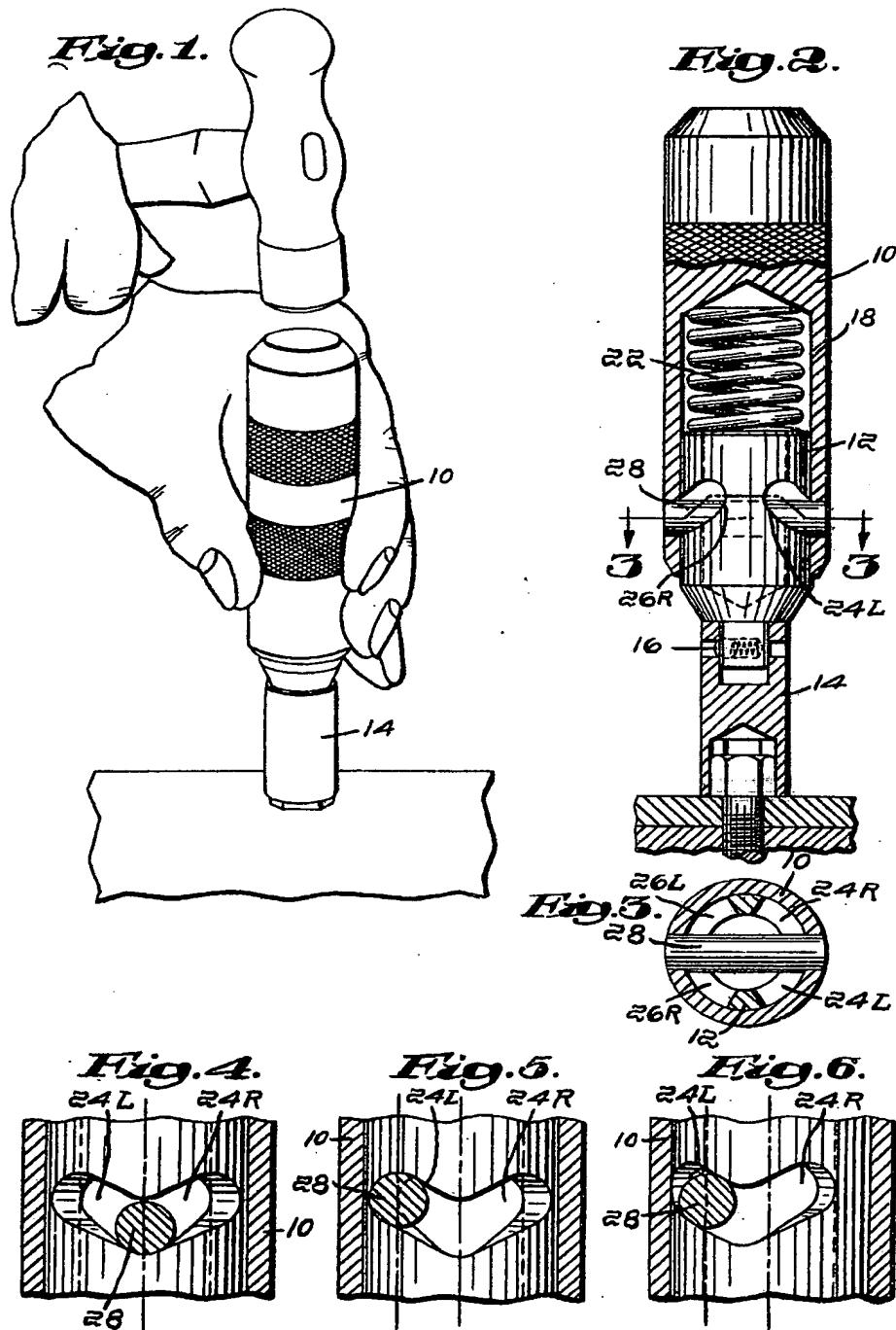
3. An impact operated screw turning tool substantially as described and illustrated by the accompanying drawings.

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